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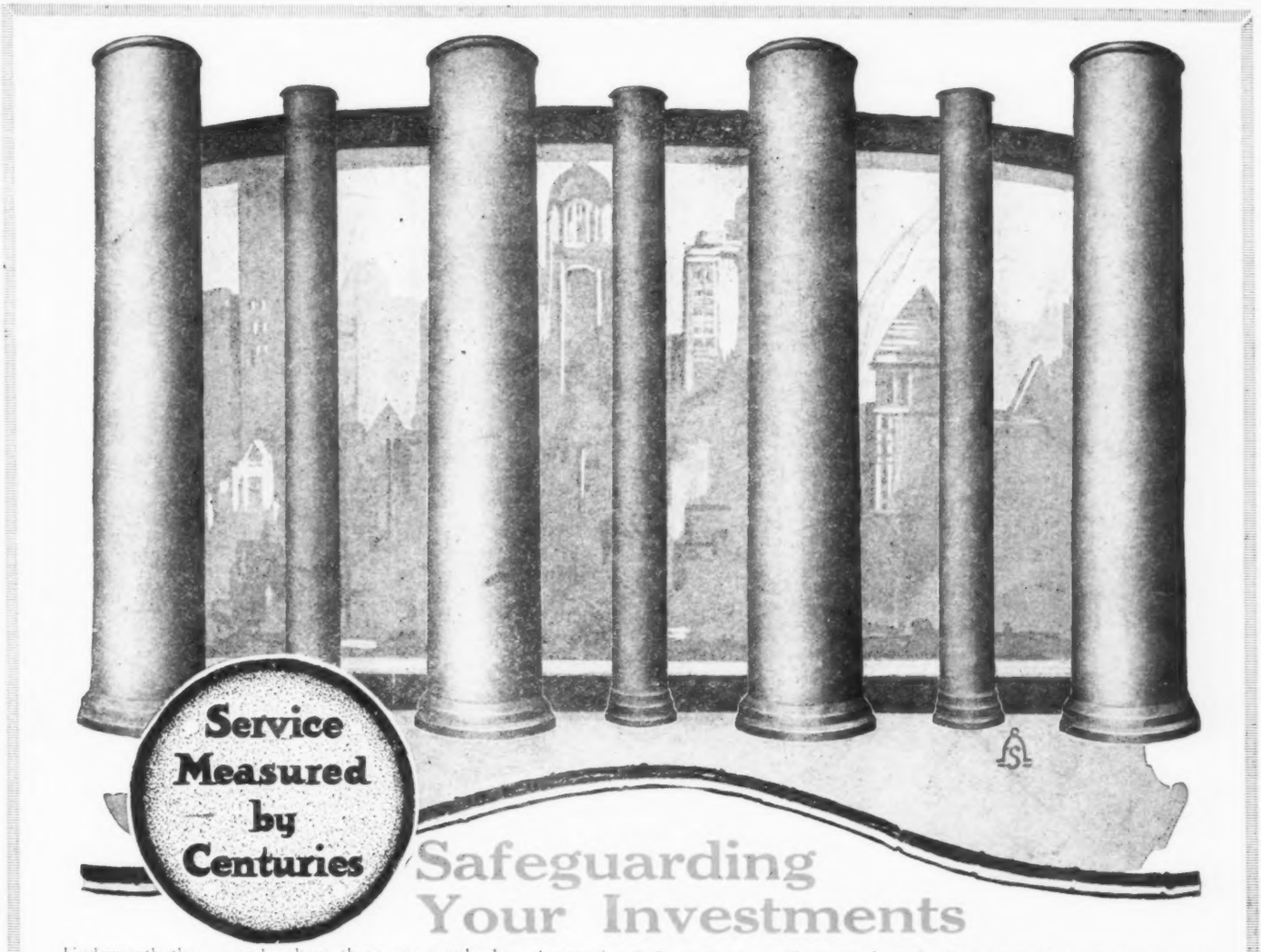

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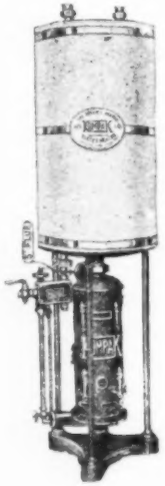

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French Experience with Gas-Fired Boiler Installation Demonstrates Possibility of Complete Combustion of Low B.t.u. Gas Without Preheating Supporting Air

Aim to Utilize Low-Grade Coal and Unmarketable Waste—Combining the Advantages of Both Solid and Gaseous Fuel

By JOHN H. BARTLETT, Jr.,

Engineers and works managers are frequently heard to express certain doubts as to the possibility of obtaining complete combustion with gas of very low calorific value without the use of supplementary heat furnished by preheating the air destined to support this combustion.

Difficulties in lighting and in maintaining a stable combustion are feared and it is commonly considered to be of prime necessity to provide for an excess of air in order to ensure the gas being completely burned. For the most part, these ideas are traceable to the fact that the designs and equipment used have almost always been more or less defective, and it is thought that in this connection a short description of the tests recently made on firing a water tube boiler with lean producer gas at Montrambert (Loire) may present some interest.

Some readers may already be familiar with the studies and experiments carried on during latter years by the Societe des Houilleres de Montrambert et de la Beraudiere of St.-Etienne (France) with the aim of utilizing in the most economical and rational way the slack from their mines and their low-grade coals. In order to pursue these studies this company built a complete test works of 500 k.w. capacity which is operating regularly at present, furnishing the power used in the exploitation of the shafts at Montrambert, and producing a surplus which is turned on to the distribution system of the Cie. Electrique de la Loire et du Centre, with which this installation is connected. A few words will perhaps be necessary to hastily describe this installation and to explain the connection between these projects and the tests recently made upon the use of producer gas for boiler firing.

To Utilize Slack and Mine Waste

In order to utilize this slack and mine waste, which is a coking fuel containing 42-45 per cent of moderately fusible ash and 18-20 per cent of volatile matter, the Societe des Mines de Montrambert has had recourse to gasification, dividing the operation into two parts. The coal is first charged into coke ovens, the by-products being recuperated and the waste heat employed for steam generation; the coke thus formed is next utilized in gas producers and the gas produced is employed in two internal combustion engines for generation of electrical power.

By this method are avoided the difficulties resulting from a direct treatment in producers of a coking coal, rich in viscous tar and which produces continuously through agglomeration, compact masses of clinker in the producer and gives off a gas whose purification is extremely difficult. These low grades of coal can be handled very well in coke ovens and the use of coke in the producers permits an exact regulation of the latter, making it possible to produce a gas which is practically constant in composition and calorific value.

Since this gas is to be used in internal combustion engines, its purification is necessary; but the Societe des Mines de Montrambert considers that even if the gas were destined for industrial furnaces or boilers it would be worth while in most cases to purify it to a certain extent and to recover, as far as possible, the condensable by-products and the sensible heat carried by it.

Their installation of two 10-ft. rotating grate producers is therefore completed by purifying and cooling apparatus which ensures the deposit of the dust and tar contained by the gas, and which cools and so dries it, preheating the air blast for the producers at the same time. In this same apparatus the hot air is saturated with water and the proportion between the weights of water vapor and air furnished to the producer is easily controlled by regulating the temperature of the air.

The gas after its passage through this apparatus is discharged by an extractor into a series of purifying cases and finally passes to a holder from which it is drawn by the suction of the gas engines.

A supplementary installation is added to the equipment mentioned above for the recuperation of the nitrogen contents in the coke of which about 700 per cent is recovered in the form of ammonia salts. The further

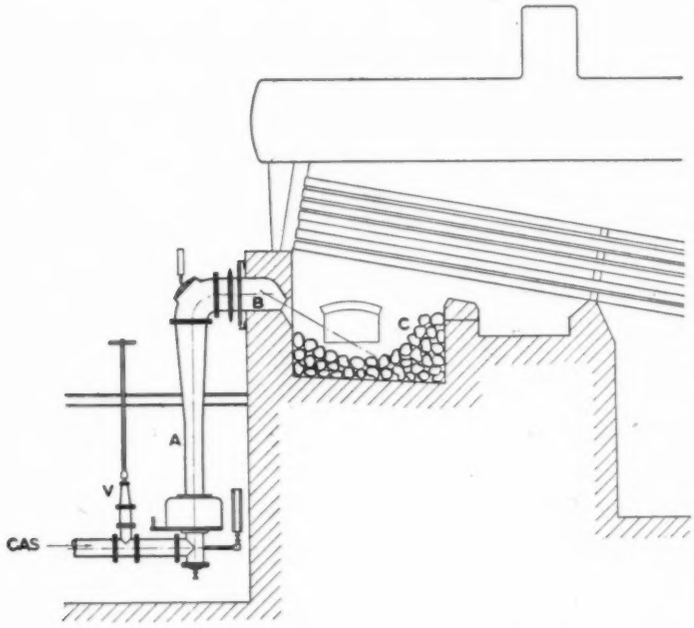

FIG. 4.—LONGITUDINAL SECTION OF BOILER WITH GAS BURNER

recovery of sulphur compounds and other products is being studied.

FIRING BOILERS WITH PRODUCER GAS

The works has been in normal operation for about two years furnishing a monthly production of 200,000 k.w. hours which are utilized by the Societe des Mines de Montrambert or discharged upon the system of the local electric company. Its operation has been so successful that the Societe de Montrambert is at present considering the construction of a large works comprising coke ovens and producers capable of handling all the low-grade coal and non-salable waste produced by its various mines. It was as part of this project that this company decided in 1919 to experiment upon the use of the available producer gas for the firing of boilers in order to determine whether this gas was suitable under practical conditions for such an application and also to find out what efficiency could be expected of a boiler so fired and whether it would be advantageous to provide batteries of boilers supplying turbo-generator groups instead of internal combustion engines. For this test they chose the boiler installed near the battery of coke ovens and which is normally heated by waste gases from the latter. This boiler (Fig. 1) is of the Buttner type (water tube) having a heating surface of 80 square meters (about 860 sq. ft.) and is installed in the open air, without economizer or feed-water heater. It had been in operation for about ten years and the tubes were fouled by the tar and the lampblack deposited by the waste gases coming from the coke ovens. Prior to the test the interior of the tubes was cleaned, but it was impossible to reach the exteriors in order to remove scale and soot, which fact probably reduced the boiler efficiency to some extent. The brick setting was in rather poor condition.

For the firing of this boiler the principle of "surface combustion" was used, employing the patented process and equipment of an American firm, the Surface Combustion Company of New York. This process consists in mixing intimately the gas with the air necessary for its combustion in their exact chemical combining proportions (without excess of either air or of gas) and in projecting this mixture into a porous bed of refractory material at a speed sufficient to avoid any possibility of backfiring. Almost instantaneous combustion takes place in contact with the hot surfaces of the refractory pieces composing this bed which is rapidly brought to incandescence and serves as a source and reservoir of radiant heat.

It is in this form that heat is most penetrant and the most rapidly absorbed by the object to be heated, although this factor has been frequently lost sight of in the application of gas burners to the firing of boilers.

In the usual boiler practice with the solid-fuel fire box not only is the boiler heated by absorption from the hot products of combustion, but also to a very considerable extent by radiation from the surface of the fuel bed. Efficiency is lost, however, in the use of solid fuel owing to the large excess of air required for complete combustion, with consequent lowering of the flame temperature.

In the usual methods of firing boilers with gas the reverse is true and a more or less high flame temperature is obtained, according to the degree of perfection of the burner employed, but this flame is practically non-radiant. Contact of the hot gases or of the flame itself with the tubes is therefore relied upon for heating the boiler, which thus becomes to all intents and purposes practically a waste-heat boiler.

COMBINING THE ADVANTAGES OF BOTH SOLID AND GASEOUS FUEL

If therefore we can utilize the efficiency of generation obtained by perfect control of a gas mixture with consequent high-flame temperature, and at the same time present an efficient radiant surface to the boiler, we shall realize the combined advantages of firing with gaseous and solid fuels. This was the object in view and, it is felt, attained in the design of equipment for this work.

Fig. 4 represents a longitudinal section of the boiler

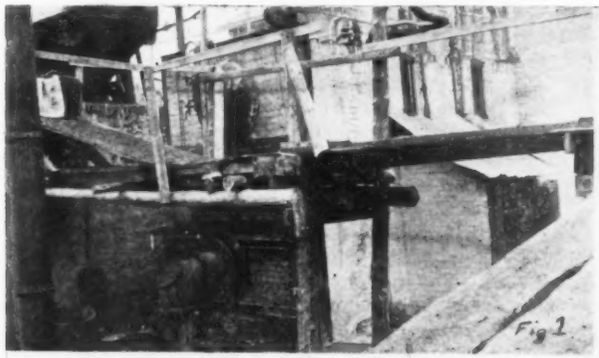

FIG. 1.—THE BUTTNER BOILER WITH GAS BURNER INSTALLED

FIG. 2.—GENERAL VIEW OF PRODUCER INSTALLATION

FIG 3.—GAS HOLDER

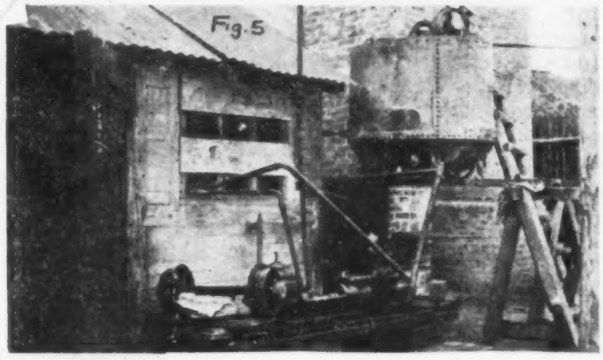

FIG. 5.—EXTRA PUMP AND RESERVOIR INSTALLED TO MEET INCREASED EVAPORATION UNDER GAS FIRING

FIG. 6.—CLOSE VIEW OF BURNER, WITH INSPIRATOR AND VALVE IN POSITION IN BOILER SETTING

fire box transformed for the use of gas. The gas was drawn from the holder by a Roots blower which raised it to a pressure of 12 to 16 in. of water and transmitted it through an overhead pipe line to the boiler. This pressure is employed in the inspirator "A" consisting of a gas nozzle and Venturi throat, to inspirate from the atmosphere the full quantity of air necessary for the complete combusiton of the gas. The high velocity of the gas and air passing through the throat completes their intimate mixture and this mixture is delivered, under pressure, to the cast-iron burner "B," which discharges it at a suitable velocity into the refractory bed "C." This burner is designed to present the minimum of metallic surface to the radiation from the furnace and its cross section is sufficiently great to ensure the rapid conduction of any heat absorbed to the exterior, where this heat is dissipated to the air by means of cooling fins cast integral with the body of the burner.

A feature to be noted is that the inspirator "A" maintains automatically constant the proportions of air and gas furnished to the burner without the need for any attention on the part of the operator. The gas consumption and therefore the rate of evaporation of the boiler may thus be regulated by the operation of a single valve (V) in the gas supply line as long as the quality of the gas remains approximately constant. By this means, combustion under the most efficient conditions is assured—i. e., without excess of air or of gas and at the highest possible temperature.

Since a draught is not necessary for the proper operation of this system, but, on the contrary, is rather harmful, the boiler was isolated from its stack and a small brick flue built against the rear of the setting mounting to the same height as the latter, into the bottom of which flue the waste gases were discharged from the breeching. A small damper in this flue permitted the control of the pressure in the boiler setting.

During the period of installation of the gas burning equipment, the boiler was shut down. It was therefore entirely cold when first started up and contained water up to the normal operating level. The burner was lit quite easily by means of a small torch of oily waste. At the end of 40 minutes of heating the boiler was in full operation at 120 lb. pressure as was indicated by steam escaping from the safety valve. It may be safely said that this was faster than this boiler had ever got up steam before and this speed of heating demonstrates conclusively the extreme flexibility in responding to

variation of load which a battery of boilers fired with gas by the surface-combustion system would have.

Feed-Water Capacity the Limitation of Production

A continuous test of the boiler at normal pressure (6½ kilos = 93 lb.) was next attempted, but at the end of a short time it was discovered that the injector and the feed pump with which the boiler was equipped taken together were of a capacity insufficient to supply its demand when in full operation with gas firing. A second and more powerful pump was installed and a new pipe line was run doubling the capacity of the water feed. Even with these arrangements the factor limiting the production of steam was still the feed-water equipment and not the boiler itself, and it was impossible to allow it to operate continuously at its maximum evaporative capacity. This latter is apparently in the neighborhood of 30 kilos of steam per hour per square meter of heating surface (6.15 lb. per square foot). A 24-hour test was, however, obtained during which the average rate was 23.75 kilos per square meter (4.9 lb. per square foot) which is about double the normal steam production for this type of boiler. The water feed was measured by a meter known to be correct and the gas by observations made upon the gas holder, which during this test was used to supply only the boiler. The boiler was connected in upon a steam line at 6½ kilos and the pressure during the test was therefore maintained at this figure.

The average production of steam was found to be 1,900 kilos per hour (4,200 lb.) with a gas consumption of 2,485 cubic meters (87,800 cu. ft.) per hour measured at the holder and of 1,990 cubic meters (70,300 cu. ft.) per hour measured by the nozzle in the inspirator. Since the temperature at the holder averaged 49 deg. Cent., and the gas was saturated with water vapor at this temperature the consumption calculated by the holder was corrected for the normal pressure and temperature at the works laboratory, account being taken of the volume of water vapor contained. The above figure then becomes 1,970 cubic meters per hour (69,600 cu. ft.) at 718 mm. and 15 deg. Cent., which checks quite well with the consumption calculated from the pressure at the inspirator nozzle, or, correcting to 0 deg. Cent. and 760 mm. 1,765 cubic meters (62,300 cu. ft.) per hour. In round figures therefore one cubic meter of gas produced 1 kilogram of steam (16 cu. ft. of gas produced 1 lb. of steam). The calorific value of the gas was controlled by a Junkers calorimeter and varied during the test from 813 (minimum) to 902 (maximum) calories per cubic meter (91.3 to 101 B.t.u. per cubic foot)—average 856 at 15 deg. Cent. and 718 mm. (96.3 B.t.u.). From these figures the over-all thermal efficiency of the boiler is figured as equal to 73.3 per cent. This efficiency could without doubt be improved appreciably with a clean boiler well constructed with a view to economy. The coke consumption of the producer averaged 450 kilos (1,000 lb.) per hour, 45 per cent ash content, calorific value not over 4,000 calories per kilo (7,200 B.t.u. per pound).

The pressure and temperature of the flue gases were measured. Near the bridge wall a pressure of 5 mm. of water was found and immediately before the register in the small chimney there was a suction of 5 mm. At the same place the temperature of the gases was 344 deg. Cent. on Dec. 20 and 354 deg. Cent. on Dec. 21.

Frequent flue-gas analyses were made—the average of these was 17.9 per cent CO_2 with sometimes several tenths per cent CO and at other times a slight percentage of oxygen according as the gas varied in quality.

The samples taken at the bridge wall checked well with those at the breeching, showing that combustion was complete in the fire box before contact of the gas with the tubes.

In view of the satisfactory results which these first tests have given the Societe des Houilleres de Montrambert et de la Beraudiere is considering at present the use of producer gas for firing an important battery of boilers as a part of a large project for the utilization of its waste coal.

The installation described above was made by the Cie. Gle. de Construction de Fours, 32 Rue de la Grange-aux-Belles, Paris, employing the patented process and equipment of the Surface Combustion Company of New York.

The writer wishes to acknowledge his indebtedness to M. Blache of the Societe de Montrambert for much of the information above, and for the many courtesies extended to him during the tests.

Diminishing Supply of Hard Woods Makes Better Market for Gas in Curing Meats and Fish

W. T. Hudson Explains Methods of the Packers—How Gas Is Applied

By smoking, meats can be preserved for commercial and export use. The time elapsing in the smoking process determines the amount of cure for different classes of trade.

By pickling and smoking, a finer grade of meat can be procured for the different tastes; in fact, the curing of meats is both an economical and healthful process.

Heat is employed in connection with smoking, fat-rendering, boiling and other branches of the packing trade. Wherever heat is needed, gas fuel is particularly adapted on account of economies and other qualifications which will be described later, declares W. T. Hudson, of the Brooklyn Union Gas Company, in a paper prepared for the American Gas Association convention to be held in New York City next month.

Special burners, heating devices, boilers, smoke-houses, etc., have been standardized by gas companies and manufacturers to such an extent that nearly every packer's or provision dealer's wants can be taken care of with entire satisfaction.

Hard woods which must be used for good smoking are fast becoming scarce, and on account of their high prices are almost prohibitive. Gas at any reasonable price can successfully compete for packing purposes.

The purpose of this paper is to so describe the processes of the business and the appliances used in it that not only will the gas men be able to sell appliances with the assurance born of knowledge, but that the provision dealer or those proposing to enter the business will be assisted in a material way.

Before smoking, in the case of hams and bacons they are pickled in a brine or saltpeter solution, and it is the action of the brine, in conjunction with the tannic acid of the smoke, which does the curing.

The different processes through which hams and bacons must pass before they are finished will be treated in their proper order.

Curing the Meat

Curing or preserving hams and bacons calls for the utmost care, for if it is not properly attended to no amount of smoking or after-treatment will overcome the failure to do this important part of the work. The strength of the brine and the length of time the meats are allowed to soak affect the keeping qualities as much as, if not more than, the smoking.

Hams and bacon should be allowed to remain in the brine, or pickle, as it is called in the trade, for from thirty to eighty days, the time of soak depending on the size of the meat (heavy hams requiring naturally more soaking than light ones) and the probable length of time that is to elapse between the pickling and the actual using of the meat.

If the meat is for immediate local consumption, it naturally requires a shorter soak than if it was being prepared for shipment to a distance or for export. In the latter case it might be well soaked for eighty or even ninety days, until it practically becomes "stiff to the bone."

A standard recipe for a pickle solution is: Saltpeter, 12 oz.; rocksalt, 25 lb.; sugar, 4 4/10 oz.; bicarbonate of soda, 4 oz.; water, 50 to 60 gal. This pickle should be made in large receiving vats and held at 80 deg. Fahr. until the salts, etc., have been dissolved.

Pickling vats are to-day commonly made of slate or cement. The latter are generally cast on the premises, suitable drains, etc., being cast in place. Cement is naturally absorbent and would not last under the action of saltpeter. This destruction is prevented in a simple manner, that of greasing the insides of the vat with pork rind thoroughly before the tank is used.

Sometimes, due to carelessness or other reasons, hams are not smoked immediately after curing but are allowed to lie around, become dry and then put back in pickle to soften them before finally smoking. This is not good practice and should be avoided. The curing of the ham has a direct bearing on the loss in shrinkage in smoking. A freshly cured ham smokes better and with less shrinkage than an old recured ham.

The pickle solution should be discarded after it has been once used, otherwise successive batches might be contaminated by the presence of a bad ham or bacon in a previous batch.

Rinsing and Drying

After the meats have been taken from the pickle they are placed in another vat containing fresh water to remove the surplus salt before smoking. This makes the meat more palatable, as well as giving it a better appearance after being smoked.

From the rinsing tank the meat should be hung to dry in the air of the room, generally the room containing the smokehouse. They should hang until no further water will drip off. If this is not done and the meat is smoked before this surface water has been drained off, the smoke will not take effect, giving the meat a striped or discolored appearance.

Smoking

The hams and bacons (the term bacon includes sides, bellies and hocks; in fact, in the trade any portion of the hog which is smoked may be called bacon) are now ready to be placed in the smokehouse to be warmed and smoked.

In small houses, both portable and brick, the bacons are strung on wooden sticks, being spaced far enough apart so that they do not touch while hanging and so that good circulation of air and smoke will be possible. The sticks are carried to the house and placed on racks, one after the other, tier upon tier, until the house is filled. In larger, more pretentious establishments the trolley-tracking system is frequently employed to facilitate quickness in handling.

Houses should be warmed before loading, especially in winter, in order to remove any dampness which might exist.

With all the conditions which have been mentioned carefully adhered to, we have come to the point where the actual smoking may be taken in hand, knowing that the finished product will meet all expectations.

The gas should now be lighted and the temperature of the house brought up to 112 deg. Fahr. until the meats have become dry and have stiffened. This condition may be looked for in from one to three hours, and is determined by feeling of a few of the pieces. The house will now be at a temperature of about 120 deg. Fahr. At this point the meats should be carefully watched, for they will soon start to drip grease. As soon as the fat starts to drip the gas should be turned off and the sawdust which has been placed on the floor of the house should be lighted. How this sawdust may be lighted will be described later. With good draft conditions, absence of back drafts, etc., the heat from the burning sawdust will be sufficient to carry the house through the remainder of the smoke.

The amount of sawdust to use and the time of smoking will be determined by the color desired and the requirements of the trade, a short smoke giving a light color and a long smoke the darker colors. The minimum time to smoke should be from six to twelve hours.

The sawdust or chips (which will not blaze) should be of hardwood. Each variety of hardwood used for smoking has its own distinctive flavor. Hickory wood is generally preferred, although oak, cedar, ash, beech, etc., may be employed.

After smoking, the door of the house should be opened and the meats allowed to cool. They should be handled as little as possible, for by continued handling they soon lose their bright and attractive appearance.

Shrinkage

The question of shrinkage, by which is meant the loss in weight of the meat as first cut and when it finally comes out of the smokehouse finished, is an important question to the packer. Careless handling, repickling, as previously explained, excessive temperatures during drying or smoking, erratic temperatures during smoking—all affect the packer in this important question.

Hams may be smoked with as little as 5 to 7 per

cent loss in shrinkage, and this, through carelessness or the use of fuels whose heat may not be readily controlled, may amount to as much as 15 to 20 per cent.

By the use of gas the temperature of the house may be kept practically constant and the shrinkage kept at a minimum. The saving effected by the reduction of shrinkage losses more than offsets the added cost of fuel. This ultimate economy has been borne out in practice time and again.

Sides and bellies will naturally show a greater shrinkage than hams; a 10 or 12 per cent loss is to be expected according to the trade for which they are smoked or the climate in which they are to be sold and consumed. A greater shrinkage than this is a direct, irrecoverable loss and may be avoided by the use of gas fuel.

Wuerst, Sausages, Bolognas

Wuerst, by which is meant all chopped meats enclosed in casings, is an important part of the packing industry. They differ from hams and bacons in that they are not pickled in brine before smoking.

After the meat has been chopped and seasoned it is taken to the icehouse and cooled thoroughly before being placed in casings.

After the casings have been filled the wuerst should be hung on wooden sticks and racked in the smokehouse, leaving ample space between strings and between racks to insure good circulation.

The heating of the house and the smoking of the wuerst now takes the same course as has been prescribed for hams and bacons, except that the duration of smoking need be but from two to three hours and at a temperature of from 130 to 150 deg. Fahr.

Wuerst will not smoke properly if allowed to become damp or slimy before smoking. This condition follows if the wuerst is allowed to become old before smoking or if it is allowed to hang around for any length of time in a damp room. No amount of smoking will cure and make good sausage when it is old and soured.

Likewise, if the wuerst is too thoroughly dried before smoking they will not smoke properly or show a color.

After smoking, wuerst should be cooked for two or three hours in water held at a temperature of 160 deg. This cooks them sufficiently for keeping qualities, and if this temperature is exceeded the wuerst will shrivel and shrink. When cooked the wuerst is hung up to dry. They are now pleasing in the color and ready for the market.

Kosher Meats

Kosher meats are beef products and are not pickled, but depend for curative properties on the duration of the smoke and the temperature at which they are smoked. They are generally smoked for twenty-four hours or longer and at a temperature of 240 to 260 deg., according to the weight of the meats to be cooked. The word "cooked" is used purposely, for it will be noted that the temperature given is above the boiling point of water and the meat is actually cooked in preserving it.

Fish

The smoking and curing of fish is vastly different from meat; in fact, it is a business all by itself. It requires different handling throughout, the utmost care as to temperature, and it is safe to say that no fuel will take care of it so readily as gas.

The preparation of fish for smoking is simple. The fish are cleaned and scaled, hung on iron rods, spaced so that they do not touch, leaving an air space between each fish, and allowed to drain before placing in the smokehouse.

The doors of the house are now closed and heat applied slowly until the temperature of the house has reached 180 deg. Fahr. During this time the flue of the house should be left open and plenty of air allowed to circulate through it so that the "steam," as it is called, will be quickly removed from the house as it is given off by the fish. If the temperature is not carefully controlled and allowed to rise above this point the fish will cook, become soft and drop to the floor. This drying period depends on a number of conditions, taking longer with some fish than with others, longer on damp, humid days than on dry days, and other factors which sometimes may not be controlled. If the fish has opened up where split and the inside of the belly feels dry to the touch, the doors may be closed and smoking begun.

Hardwood sawdust and shavings may be used to make smoke. This operation takes about two hours, and generally one batch of sawdust is sufficient for the smoking period and is allowed to burn out before the doors are opened.

The fish is now removed from the house, allowed to cool to room temperature, and is ready for shipment.

Salmon

Salmon requires different handling than other fish, inasmuch as it will not stand direct heat. It must be dried very gradually in order to stiffen it. A current of warm air should be used at a temperature of not more than 100 to 110 deg. Fahr., allowing the air to pass along the sides of the strips after they have been hung in the smokehouse. The drying period may take two or more hours, depending on the volume of air used and its percentage of humidity. Drying is known to be completed by feeling for moisture with the hand.

After the strips are thoroughly dried, smoke may be applied, using sawdust or shavings, for one or two hours, very little smoke being required.

All has not been said about smoking fish, each dealer having his own tricks and methods. It has only been intended to give enough information for general guidance and the smoker will not go far wrong if he follows the rules given and will learn how to deviate from them as his experience dictates.

Construction of Houses

As a rule, smokehouses for large dealers are made of brick and are built on the premises. The floor dimensions vary to meet the condition of the house in which they are built; but, generally speaking,

(*Continued on page* 330.)

Minimizing Accidents in Distribution Work

R. S. Carter of Opinion That in Laying Gas Mains Danger Can Never Be Entirely Eliminated but Safety Efforts Accomplish a Great Deal More Than They Cost

It has been estimated that from 30 to 50 per cent of industrial accidents can be prevented. The greatest preventive is "Carefulness." It brings its own reward in a marked decrease in the number, and in a reduction of the seriousness of the accidents not altogether to be avoided.

Certain industries include operations from which danger can never be entirely eliminated, and I think the work of laying gas mains comes in this class, declared R. S. Carter, superintendent of the Malden & Melrose Gas Light Company, Malden, Mass., in a paper delivered before the Public Utilities Section at the Ninth Annual Congress of the National Safety Council, Sept. 28, 1920.

One of the greatest hazards when men are laying gas mains is the possibility of gas poisoning; and while the percentage of accidents from this cause is small, it is always before us, and must be carefully guarded against. Accidents of this nature occur when connecting new work to existing live gas mains.

Guarding Against Gas Poisoning

To guard against gas poisoning, we use respirators that can be worn with comfort when men are obliged to work in the presence of gas. It has been our experience that equipment of this sort must be carefully investigated before it is turned over to workmen for use. If a man has no confidence in the respirator or mask he is told to use when going into a gas-filled trench, it is next to impossible to impress upon him the necessity of wearing the safeguard, and it is not unusual to find him "taking a chance," with the odds against him, when working in a most hazardous place.

Also if an employee is exposed to a danger of this sort, a life belt and rope should be buckled around his waist with a man holding the rope so that in the event of an emergency, it would be possible to pull him out of the trench.

In all cases of accidents, the suffering, inconvenience, and interference with a man's regular line of work is so great that when an analysis is made the cause, many could be avoided by following instructions and precautions. The results furnish a strong argument in favor of practising care and caution in the performance of our daily work.

Preventive measures when furnished should be used; they may make "first-aid" treatment unnecessary.

In the illustration above I referred to a gas main "stopper." This piece of equipment is used to temporarily stop the flow of gas while connections are being made. When working on small-size mains, a rubber bag is used to stop the flow of gas, and as an extra precaution, when laying large mains, say, from 10 to 30 in. in diameter, a canvas-covered bag is used together with a stopper. Cloth or canvas-covered bags retard the solvent action of city water found in some mains which is very detrimental to rubber.

It can be readily appreciated if a "bag" or "stopper" should collapse from any cause when the main is open, a most serious and dangerous situation would immediately develop.

Handling this part of gas-main construction work is particularly hazardous, and invariably we find men who believe they are immune from gas poisoning, and expose themselves unnecessarily to the action of the fumes.

Preventing Fumes When Putting in Services

When service pipes are installed, it is necessary to tap the main pipe preparatory to inserting the screwed fitting from which the service pipe will run. Many times the threads on service fittings and pipe are defective, and do not readily "make up." The gas will escape during the time the man is trying to screw the service fitting into the main pipe. If he remains too long at this task with the gas leaking around the fitting, he is running a great risk of being overcome. All threaded fittings should be examined before they are used to determine the condition of the threads.

When an employee is overcome by gas, it is important that his foreman and fellow employees on the job should know what to do, and how to handle the victim. To this end, frequent instruction in the prone pressure method of resuscitation should be given. Mechanical apparatus designed to assist respiration has its place, and when used by parties familiar with its operation, will do effective work. It is our belief, however, if all our employees are familiar with the prone pressure method of resuscitation, they are always prepared to meet an emergency, and render "first aid" until medical assistance can be called.

Other accident hazards that exist when laying gas mains may be enumerated as follows: Caving in of trench; defective tools; pouring hot lead in pipe joints; blasting; flying particles of iron when cutting pipe; tripping over loose material lying around; lack of, or poorly constructed barricades for enclosing street openings, and the absence of danger signs and lanterns.

The caving in of trenches occurs frequently in sandy and wet soil. This hazard can be overcome by close-sheathing both sides of the trench and firmly bracing it with strong timbers running lengthwise and crosswise of the cut.

It is better to close-sheath an excavation than risk the possibility of a cave in.

Defective tools contribute liberally to painful and serious accidents. A cold iron chisel used when cutting cast-iron pipe if badly mushroomed on the striking head is a most dangerous hazard, not only to the parties using the chisel, but to persons near by. The possibility of the handle breaking, permitting the chisel to fly and do injury is made even worse by the presence of the mushroomed head. It is from tools of this kind that pieces of steel break off, causing serious eye injuries. When men are cutting pipe by means of striking hammers and cold iron chisels we provide goggles, and this simple, inexpensive preventive against eye injuries has worked wonders.

Explosions of hot lead when poured into pipe joints, particularly if they are wet, must be guarded against; and the danger of flying pieces of stone when blasting ledge must be carefully watched.

The tripping hazard is always present in all classes of work where loose material is left lying around. Its remedy is obvious and simple.

Avoiding Sparks in Frozen Ground

Frequently it becomes necessary to dig down to gas mains during the winter months when there may be from three to four feet of frost in the ground. When digging out frozen ground, great care should be taken not to strike sparks where gas is leaking; also when "barring" for gas leaks along the line of main, the "barring holes" should never under any circumstances be lighted off. Leaking gas is a serious hazard at best. It becomes a greater hazard when men attempt to find the leak with a lighted match.

The seriousness of searching for gas leaks with open flames is well expressed in a recent bulletin issued by the National Safety Council, which reads as follows:

GAS MEN—

Looking for gas leaks with a match, lighted candle or other open flame is an old stunt, but—it's still being done.

USE A FLASHLIGHT TO LIGHT THE WAY AND YOUR NOSE TO FIND THE LEAK.

If the open end of a live gas main should take fire from any cause, it is practically useless to try to extinguish it with water. The flame must be smothered, and this can be done with wet blankets, sand or dirt. Pouring water into an open-end gas main on fire might cause trouble in other parts of the system by stopping or "sealing off" the supply. If this occurs, a greater hazard than the fire itself will be present.

The fire hazard is also introduced by the curious non-thinking person who may be smoking in the vicinity of escaping gas. This danger is usually controlled by a watchman stationed on the job to keep a check on conditions of this kind.

Protecting the public from injury when laying gas mains is essential. This is accomplished by providing substantial bridges with adequate handrails over trenches at crosswalks. All openings in the streets must of course, be properly guarded with danger flags and barricades so that pedestrians and vehicles will keep away from same. Distinctive colors, visible a long distance away, are used when painting the crossbars of the barricades. Black and white bands arranged diagonally across the bar have been extensively used.

Summarizing, it has been said, "Accident prevention saves misery and money." Until recent years, this two-fold saving has not been much appreciated, and in striving to put through work at low costs, the avoidance of accidents has been overlooked as one of the big factors in reducing the cost. This applies to laying gas mains just the same as it does when manufacturing staple articles.

Accidents to employees in all departments are costly to the employer. The injured man's services are lost and they must be replaced, temporarily at least with a man lacking in experience and qualifications that made the injured man valuable.

It must be the constant endeavor on the part of all employees and executives in industry to keep the subject of "Accident Prevention" always in the front. It is our practices to set aside "Accident Prevention" and "First Aid" days at which time all employees of the company are brought together for the purpose of receiving instructions of how to avoid accidents, and how to render effective first aid when they occur.

Bureau of Mines Estimates Loss of Gasoline Through Evaporation at 600,000,000 Gal. Per Year.

While engineers, chemists and automobile men throughout the country have been bending their best efforts toward developing some liquid fuel as a substitue for gasoline to meet the ever-increasing demands of the fast growing automotive industry, the United States Bureau of Mines comes forward with the declaration that the entirely preventive losses in the evaporation of gasoline from crude petroleum from the time the petroleum leaves the wells until it arrives at the refineries reaches a total of more than 300,000,000 gal. each year, or sufficient to keep 1,200,000 automobiles in commission for a year if each car uses 250 gal. of gasoline.

These, according to the Bureau of Mines, are merely the preventive losses from evaporation alone and do not take into consideration other losses, to more than 600,000,000 gal. of gasoline for the country, according to the investigations of the bureau, which has calculated that one-half of this, or 300,000,000 gal. of gasoline, may be saved.

The worst feature to this is the fact that the gasoline wasted is the most volatile and consequently the best quality of gasoline obtainable. It follows that the prevention of this loss, which is economically possible, would not only increase the gasoline supply materially but would also increase the general standard of the gasoline.

The bureau will issue shortly careful directions to the oil men as to how this deplorable situation may be remedied. It is estimated by the bureau that the 600,000,000 gal. of gasoline lost through evaporation each year is worth as a national asset about $150,000,000.

J. O. Lewis, petroleum technologist of the bureau, in his statement on these losses, says: "At a time when there exists so much apprehension in regard to the gasoline situation, it is comforting to learn of any ways in which the supply may be increased. In an intensive effort to find ways of increasing and improving the quality of gasoline, the Bureau of Mines has made an investigation of the losses of gasoline by evaporation from the crude oil in the field. Extensive experiments and investigations in the principal fields have disclosed that a great quantity of the gasoline now escapes into the air. This can be conservatively estimated at about 20 per cent of the gasoline in the crude oil. Furthermore, probably half of this, at least, can be economically recovered, and this quantity will not only increase our supply but improve its quality somewhat.

"From the time that the crude oil reaches the surface of the ground at the well, the oil passes through a series of tanks and pipe lines until it reaches the refinery, sometimes thousands of miles away. In the course of its journey the oil is exposed to sun and air, and the gasoline, being very volatile, vaporizes and escapes into the atmosphere. Although it has been generally known that such losses occur, no one, up to the present time has called attention to their magnitude.

"With the co-operation of the Bureau of Mines in placing information at their disposal, the oil companies are awakening to the losses of gasoline which have occurred, and are taking active steps to save the gasoline which formerly escaped into the air and benefited no one."

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As the Journal Views It

Does the Gas Industry Lack Vision?

Few can resist the temptation to have a fling at the mental capacities of those so-styled ultra-conservatives who have carried the gas industry over a century of ups and downs and who latterly have, without sympathy or support, carried it through the most severe test in its history.

The gas man's *vision* has again come to the fore in journals of his field, reprinted from a journal without his field and written by an author whose insight into the industry is gotten largely from the outside looking in.

No sensible man can deny there are cases of mismanagement in the gas industry. So there are in the automobile industry, the electric industry and most industries.

There is, and always will be, much to be corrected in the gas industry as well as in others. But some times are inauspicious and impractical times to apply the corrective.

Visions in the gas field just now are rather unproductive tasks It is well to have the *vision;* but the fact that at the present time we see few of them being transformed into actualities is not evidence that they do not exist, that the gas man's thinking apparatus has become petrified.

All-gas cities are a vision. But practical considerations stand in the way of its being attained.

A cheaper form of gas making is an essential; and while the means to this may not be beyond the *vision* of gas men, the money to effect it is well beyond his powers to attract.

The Convention Ahead

The striking wisdom of releasing convention papers in advance of the American Gas Association convention, to be held at the Hotel Pennsylvania, New York City, Nov. 15 to 20, is emphasized by the number and value of the papers that are now practically submerging all other matter in gas journals.

We doubt if any gas association has ever been accorded the wholesale degree of co-operation and spirit of giving as well as of receiving that these papers indicate the American Gas Association has been favored with.

This indicates that the one great association idea has taken hold and has been skilfully nurtured by those at the helm of the association's affairs. It promises well for the value that will lie in attendance at the convention.

Gas men in large numbers and from all grades, it seems apparent, will be there, not merely as passive listeners but as active participants, each eager to spread knowledge and generally help out in the solution of the industry's problems.

It thus becomes the duty and the privilege of every gas man to attend. The convention will profit in part from his presence. He will profit immeasurably from what he may there obtain.

Diminishing Supply of Hard Woods Makes Better Market for Gas in Curing Meats and Fish

(*Continued from page* 326.)

where wooden sticks are used to hang the meat upon, the house measures approximately 3 ft. wide by 8 ft. long and 8 ft. high.

It is not intended that the location of burners suggested will take care of all conditions. Peculiarities of design, draft through houses, etc., may call for modifications which only experience will teach.

Gas Capacity of Burners

It is good practice to provide ample heating capacity in the gas burners so that excessive drafts, extreme changes in temperature, etc., may be taken care of. Burners should always be turned down and the heating of the house easily regulated; whereas if too little heat is provided and smoking not possible on this account, an installation might be considered to be a failure. At least 20 ft. of gas per hour for 1 cu. ft. of house space should be provided for.

Burners must be so installed that they receive the necessary primary air. When burning in the smokehouse, the secondary air is sufficient to insure perfect combustion. Burners can be used with baffles, if desired, but this is added expense and not at all necessary.

The sawdust should never be lighted until the meats have been dried and gas heat turned off. A pilot light can be installed, if necessary, or the sawdust can be lighted by placing a crumpled piece of paper on the floor before the sawdust is dumped out of the bags. Then, when ready, light the newspaper, and this will be sufficient to start the sawdust smoldering.

Preparatory to smoking, see that the house is perfectly dry, the sawdust piled just right, the meats properly pickled, then air-dried. Now place in smokehouse, light gas burners and watch the temperature of the room. When the meats begin to drip or show bubbles on the surface, turn off gas, light sawdust, then take a rest until such time as you think you have the desired color; open smokehouse, allow the meats to become air-cooled, place on racks, and the process is finished.

New Measure for Gas

In the near future gas consumers in England will be asked to substitute "therms" for cubic feet as the basis on which to pay for the gas they consume. A "therm" is equivalent to 100,000 B.t.u. With gas at its present quality 450 B.t.u. go to each cubic foot, so that the gas bill of the future will not be for, say, 1,000 cu. ft. of gas but for 4½ "therms." If the old charge was at the rate of 4 shillings 6 pence per 1,000 cu. ft., the new rate would be at 1 shilling per "therm." In the case of a small consumer, the user of the 1 penny in the slot meter, who at present buys 16 cu. ft. for 1 penny (that is 7,200 B.t.u.), the new charge will be on that proportion of a therm. The same meters will be used, with the same dials, but notices will be issued showing the cost per "therm" on that basis.

Now in all this there is something vastly more important than merely providing the householder with the occasion for a little mental arithmetic. He is already harassed at every turn with increasing prices, and this change is almost certain to arouse his deepest suspicions, which will not be allayed when, in conjunction with the change in the basis of charges, he finds that servants of the gas company visit his premises and overhaul the whole installation. As a matter of fact the affixing of a notice to the meter and the inspection of the pipes and burners are the only indications he will have that there has been a complete revolution in the system of the production and sale of gas in this country. The light, as afforded through the medium of the incandescent mantle, will remain unaltered and there is the ultimate prospect of a cheaper and more abundant gas supply. The authority for this great change is the gas regulation act, which received the Royal assent.

Greater Demand for Petroleum Probable Effect of Coal Strike

Petroleum interests are keeping close watch on developments in the English coal strike, possibly to determine its effect upon the demand for their products. There have been repeated assertions that such a situation as England now faces hastens the installation of fuel-oil engines and equipment in industries, particularly those essential for the production of necessaries. An increase in the consumption of gasoline is looked for as a result of the strike, which may force the use of motor vehicles for passenger and freight transportation throughout the United Kingdom.

Gas Stoves and Appliances for Christmas

By William Bliss Stoddard

Instead of the flimsy, perishable presents bestowed at Christmas why not make a vigorous campaign for objects of real worth, gifts that will last for years and by their convenience serve to cause the recipient to call down blessings upon the head of the donor whenever use is made of them? This is the season par excellence for dealers in gas ranges, heaters, fixtures, and all sorts of appliances to fling their banners to the breeze, and work up sentiment for their presentation as gifts. A number of the big firms have done this with excellent results, and others could profit by their example.

Hellrung & Grimm, St. Louis, Mo., began their campaign with an effective ad, which was captioned:

HELPING MOTHER ENJOY LIFE

Housework is, so they say, woman's work; but don't you forget that a lot of it would tax a man's strength—unless mother has the labor-saving conveniences made possible by the use of gas.

Is the House Piped for Gas?

If so, why not surprise her with a new gas range for Christmas? Better yet, give it to her in advance of the holiday itself, so that she can use it in preparing the holiday feast. The real Christmas spirit will be sure to pervade the house if you do this.

Come down to our housefurnishing department — wander through the big, light and airy room, and pick out a number of gas appliances as gifts for those you love the best. Gas heaters, lamps, irons, gas plates, toasters and fire screens. Every one a beauty—and in their holiday dress a gift that will be appreciated to the utmost.

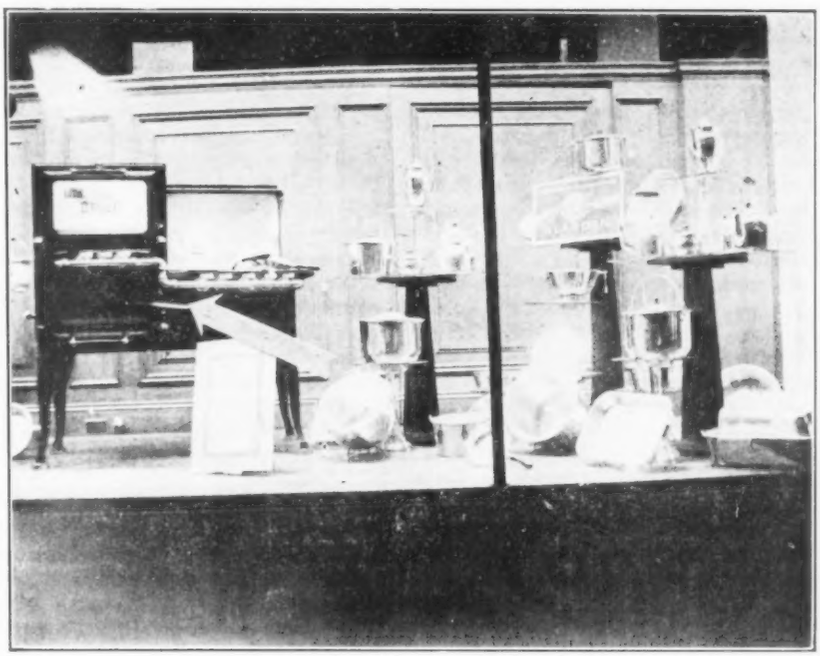
In the department stood a big Christmas tree, beneath whose branches stood a gas range. Fastened securely to the trunk was a gas heater, brightly glowing, while to the lower branches were fastened globes and shades for lamps, handsome gas fixtures, gas irons, toasters, hot-water heaters and gas plates. Some of these were attached by ribbons, and others were in boxes, with the lid removed to show the contents. A large card at the base of the tree suggested: "Make this a gas Christmas—give a gift that lasts."

The Bledsoe Company, San Diego, Cal., adopted a novel plan for getting visitors into their furnishing department. They cleared a large space and fitted it up as a music room. This they offered as a rehearsal room to San Diego Conservatory Orchestra. In return for the use of the room the orchestra, which was composed of amateur musicians, gave a concert every Monday evening. On these occasions the entire store was lighted up, and seats were scattered about all over the floor, a number being placed in close proximity to the orchestra for the benefit of the older people or those a little hard of hearing. They then sent out invitations to a large list of patrons and music lovers:

Dear Sir—

Since you are a lover of music we know you will enjoy the concert of the San Diego Conservatory Orchestra, which is given every Monday evening on the second floor of our establishment.

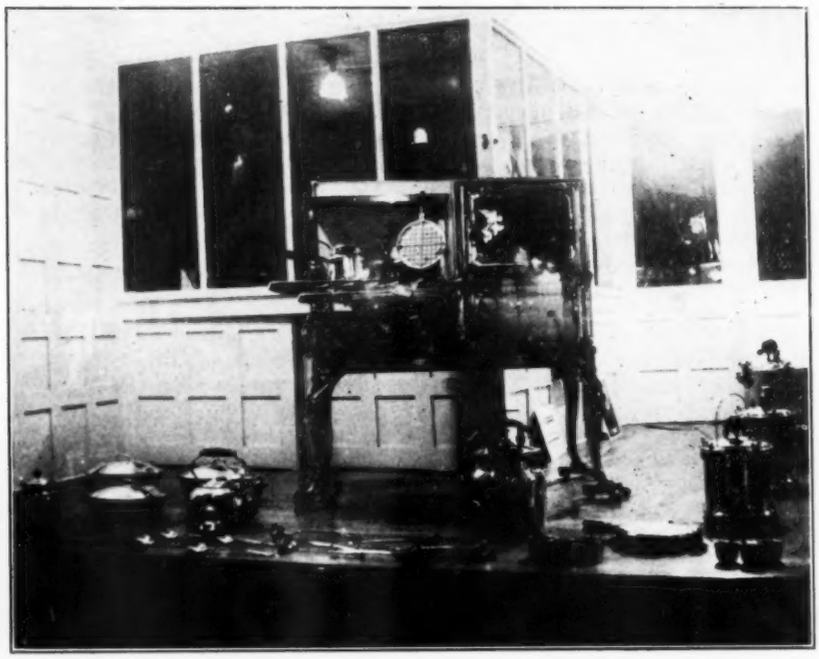
The orchestra is composed of talented young musicians, under the direction of the well-known orchestra leader, Chesley Mills, and an evening of splendid entertainment is always enjoyed by those who attend.



DISPLAY OF ALUMINUM WARE OFFERED AS PREMIUMS BY BALTIMORE COMPANY

No admission fee. Seats for all. Come and bring your friends.

The idea took at once, and it became quite "the thing" to attend these Monday night concerts, where one could hear good music, and during the intermissions stroll about, chatting with friends. In addition to the many pieces of furniture and household conveniences set about all over the floor, there was always something new arranged each week for the contemplation of the guests. Early in November they began their campaign for gas appliances for Christmas. This was announced on a huge canvas sign which extended entirely across one end of the floor. Here four rooms were fitted up, with doorways opening from one room to another. The first was the kitchen, where a gas range held the prominent position; while on a table was placed a gas iron and gas toaster. The next room was fitted up as a bathroom, and here a gas water tank supplied a constant supply of hot water—the turning of the faucet lighting the burner and supplying hot water in a minute. The next was the bedroom, and here a gas boudoir lamp and also a reading lamp were placed, as well as a gas heater. Last of all was the living room, with its cheerful gas logs, and its student lamp. Every room was lighted with gas, mantles of the latest type, and handsome decorated globes being employed. Every gas fixture and appliance bore a white card with red border and adorned with spray of holly, on the card being printed the price of the merchandise and "For Christmas—give the gift that lasts." Scores who would never think of giving a gas appliance had the beauty and convenience of these conveniences brought home to them as they walked through the rooms and had a chance to study them at their leisure. The gas home was much more effective than any window display would have been, as the uncertain weather of late fall is not usually conducive to lingering in any outside spot. Of course the main difficulty in making a display such as this is getting the people into the store and above the main floor, but this was solved, as was told at the beginning, by inviting them to attend the orchestra concerts. Nothing was said about the housefurnishings or gas appliance exhibition—it was left to speak for itself—and it did so far more effectively than columns of advertising would have done.



ATTRACTIVE HOLIDAY WINDOW OF THE NORTHWESTERN COMPANY BELLINGHAM, WASH.

The Baltimore Gas Company, Baltimore, Md., was another concern that enthusiastically pushed gas ranges and appliances during the preholiday period. In order to bring these more effectively to the attention of the public they put in a good selection of aluminum and enameled ware which they offered as premiums with the ranges. Their cards in the papers were brief but effective:

Cook the Holiday Feast on an Oriole Gas Range

In order to induce the housewife to make an early selection we offer as a holiday gift in advance her choice of any of the aluminum or enamel cooking utensils shown in our window. This offer applies only on stove sold before December 1.

Naturally the housewives flocked to see the display. The most prominent feature was a gas range with a huge red arrow (suspended by fine wires from the ceiling) pointing to the center of the stove. A big card in front of the range advised: "This is the patented elevating broiler—a convenience not to be overlooked in purchasing a gas range. Displayed on pedestals, on the floor and on the range itself were many specimens of cooking utensils. Another window showed a half dozen gas heaters and gas logs, with a card:

A Gas Heater

for these chilly fall mornings. It is always ready for use.

The Northwestern Company, Bellingham, Wash., likewise started a campaign for the sale of gas ranges for the holidays by setting forth a colorful and attractive window. The floor was covered with linoleum, and the center of attraction was a nickel-plated combination range. Tall panels of bright orange at either side had had tacked to them a number of cards in orange and sky blue, with ribbons of blue and orange running from them to different parts of the stove, each card calling attention to some particular feature of the stove. A large card advised:

THE ROAD TO A MAN'S HEART IS THROUGH HIS STOMACH

—and this is true of the whole family as well. The heart of the home is the kitchen, and enjoyment of the home life largely depends on the good things to eat that come out of the kitchen. And the things that come out of the kitchen are prepared to the king's taste and with half the trouble if the housewife possesses one of our

Gas Ranges

If she hasn't one already get her one for Christmas. Make her dreams of having a GAS RANGE come true now. Three times a day—a thousand times a year—she will bless you for your thoughtfulness.

Another window showed a gas stove, surrounded by aluminum cooking and canning utensils. On the stove was a waffle iron, cereal cooker and percolator, and a card suggested:

If a man loves a woman, that's his business; if a woman loves a man, that's her business; if they decide to get married, that's fine business. But when it comes to outfitting their modern little nest

That's Our Business

Of course every modern bride will insist on GAS, and she and the only man should drop into our kitchen department and see our complete stock of gas ranges, gas heaters, and gas appliances of all kinds.

Inside the store demonstrations of these ranges were given for a period of a week during the early part of November, and all prospective brides were especially invited to be present and ask any questions they desired regarding the ranges, as well as concerning any other gas apparatus—many different utensils and fixtures being placed on tables and shelves conveniently near.

Gas Company Tells Customers How to Reduce Gas Bills

By FRANK H. WILLIAMS

Some very interesting advertising on the topic of "How to Reduce Gas Bills" is now being done by the Northern Indiana Gas & Electric Company, of Fort Wayne, Ind., which furnishes gas to Fort Wayne and to a number of near-by towns. The advertising appears over the signature of the company and its vice-president, S. E. Mulholland, and this is the way a recent advertisement in the series read:

WASTING GAS IS BURNING MONEY

How to Reduce Your Gas Bill

Don't use the giant burner on your gas range when a smaller burner will do.

Don't light burners on your gas range until you have food all ready to go on the fire.

Don't allow a burner to remain lighted without being in use.

Don't use the gas oven to heat the kitchen.

Don't heat a kettle full of water when you only want a quart.

Don't use the ovens of your gas range for storage of food—it rusts out the oven.

Don't keep a full flame under container when water has reached boiling point. Turn down the flame or set utensil over small simmer burner.

Don't turn off cock part way at meter. It does not save gas bill, but it lessens the pressure and interferes with good service and is not economical.

Don't use gas for heating without knowing the probable cost.

Don't expect to use gas efficiently in an old wornout range, or one with burners out of adjustment.

DO—

Use gas only when it benefits you.

Whenever possible use the smaller size burners instead of the large ones.

Remember gas is no hotter ten minutes after burner is lighted than it is the instant the burner is lighted.

Turn out gas and relight it again in event there is an interval when same is not needed. Matches are cheaper than gas.

Keep burners of gas range clean by washing them in boiling water and soda at least once a month and have them dry before using, as doing this will save gas.

Don't bake pie or biscuits alone in your gas oven. Use gas ovens to their fullest capacity on baking days. Plan to have a baked dinner when you bake.

Have meter reader give you the reading of your meter and figure your own gas bill. But, better still, learn to read your own meter and read it frequently.

Use triple saucepans, set over one burner. You can cook three vegetables for the cost of cooking one. Ordinary saucepans will cook only one vegetable at a time.

Don't purchase from strangers so-called gas-saving devices without first asking us whether they are of any value.

The average gas consumption of burners on standard ranges is as follows:

	Cubic Feet Per Hour
Broilers	50
Oven burners	40
Giant burners	18
Medium burners	12
Simmer or smallest burner	4

The amount of your gas bill can be substantially reduced by using smaller burners more frequently.

A long, yellow, smoky gas flame is very wasteful, as there is not sufficient air being mixed with the gas for proper and economical combustion.

A small, blue flame is hotter than a long, yellow flame and requires less gas.

It will pay you to cut out this advertisement and to keep it near your gas range as a constant reminder.

Remember local conditions are to blame for most gas troubles. Ask us to help you remedy your conditions.

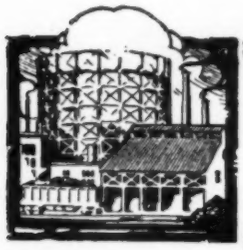
This advertisement attracted a great amount of attention and the gas company says that it was productive of much good.

Gas Company Issues Preferred Shares

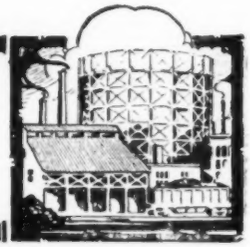
The Worcester (Mass.) Gas Light Company, at its sixty-ninth annual stockholders' meeting, voted to authorize the issuance of 3,500 additional shares of preferred stock, to be entitled to cumulative dividends at the rate of 8 per cent per annum, which is to be offered to present holders of preferred stock at $100 a share, on the basis of one share of the new for each four shares of the old.

D. Edgar Manson of Brookline, connected with Charles H. Tenney & Co. of Boston, managers of the company, was elected a director, succeeding Francis H. Dewey as vice-president.

The directors organized by the election of the following officers: President, Louis H. Buckley; vice-president, D. Edgar Manson; treasurer and clerk, DeWitt Clinton; directors, the foregoing and Francis H. Dewey, Dr. Samuel B. Woodward, George Crompton, Paul B. Morgan, Charles H. Tenney of Springfield, Charles G. Washburn and Burton H. Wright.



NEWS OF THE GAS INDUSTRY



In Attendance and Enthusiasm Ninth Annual Safety Congress Surpasses All Expectations

Safety as a Permanent National Movement Has Arrived—Probable Results of the Congress

Hundreds of shops, factories and industrial plants of all sorts hitherto lacking interest in safeguarding their workers will be organized for safety for the first time—hundreds more which had already instituted safety work will see great improvements within the next year—thousands of lives will be saved—thousands of crippling accidents will be prevented and an immeasurable amount of human suffering averted—millions of dollars will be conserved, and industrial production will be increased vitally, which will be reflected in a marked reduction of prices and consequent general benefit to the people of the country as a whole—all these things are predicted by officials of the National Safety Council as the probable results of the Ninth Annual Safety Congress held at Milwaukee Sept. 27 to Oct. 1.

In every way, it was generally agreed, this was the greatest safety congress in the history of the safety movement—in the numbers who attended and the diversity of interests they represented, in the spirit of humanization which prevailed through all the sections of the convention, in enthusiasm, and in actual accomplishments for the cause of safety during the five days' sessions.

From the opening session until the close of the week one big fact was constantly impressing itself upon the minds of the men who fathered the movement in Milwaukee eight years ago and who have attended each of the annual congresses since then, and that was—to quote C. W. Price, general manager of the council—"The conviction on the part of delegates that safety, as a permanent national movement, had arrived; that from now on the work of the National Safety Council will assume such proportions that no longer will it be a question of how to open the doors, but rather that of deciding which of the many open doors to enter."

Nor was this conviction confined to the delegates. The press, the schools, associations of commerce, and municipal governments also have come to this realization, for at this congress as at no other were the staff correspondents of newspapers and magazines, educators of all types, municipal officials, and chamber of commerce and other trade association representatives, evident.

More than 3,100 persons were registered, which means that at least that number attended the regular sessions of the congress. In addition to these delegates from the industries and municipalities throughout the country, 1,400 boys—each picked as the representative of his room in the Milwaukee schools—attended a special meeting where, with Milton C. Potter, superintendent of the Milwaukee Public Schools, in the chair, they heard from the lips of such men as R. C. Richards, retiring president of the National Safety Council, C. W. Price, and others just what the safety problem is and just what they can do toward solving it. Twelve hundred principals and school teachers, representing practically every public, parochial and private school in Milwaukee, attended a similar meeting. And on the closing afternoon of the congress 1,500 boy scouts, hundreds of them coming from other States, participated in a demonstration in the arena of the Auditorium. Add to these figures the thousands of persons who visited the exhibit of safety devices and you will agree with Mr. Price who said, "My most conservative estimate is that at least 10,000 persons visited the Milwaukee Auditorium while the sessions of the Ninth Annual Congress were in progress, and that from 5,000 to 6,000 persons were in the building each day of the week."

So much for general attendance. Approximately every sectional chairman, also, reported not only larger attendance than at any earlier congress, but a greater interest, and it was characteristic of the sectional meetings this year that at least one speaker in each section was a man of national prominence and that these men did not run off after delivering their talks, but stayed through the meeting and participated in the discussion. This was true of such men as Samuel O. Dunn, editor of *Railway Age* and president of the Associated Business Papers, who spoke before the Steam Railroad Section; of James Newton Gunn, vice-president of the U. S. Rubber Company, and president and general manager of the U. S. Tire Company, who spoke before the Rubber Section; of Dr. Otto Geier, president of the American Association of Industrial Physicians and Surgeons, and the other noted industrial physicians who addressed the joint meeting of the Health Service Section of the Council and the American Association of Industrial Physicians and Surgeons.

There were more practical demonstrations at the Ninth Annual Safety Congress, probably, than at all other safety congresses combined. Chitf among these were the first-aid demonstrations by Dr. H. W. Gentles of the American Red Cross and the first-aid teams of the Chicago, Rock Island & Pacific Railway Club at Chicago, the demonstration of grain-dust explosion hazards presented by D. J. Price, engineer in charge of grain-dust explosion investigations of the Bureau of Chemistry, U. S. Department of Agriculture; the demonstration of "The Safety Game Played as It Is Played in One Plant," presented before the Paper and Pulp Section of the Safety Department of the Kimberly mill of the Kimberly Clark Company, Neenah, Wis.; the demonstration entitled "Fixing Responsibility for an Accident," presented by the officers of the Metals Section; the demonstration of dies and automatic feeding chutes for punch

presses by August Kaems before the Automotive Section, and others.

The pace for the convention was set by a great mass meeting held Monday, the opening day—the first of this character to be conducted at a safety congress—which was unusually successful not only because of the large attendance of Milwaukee citizens but because of the high pitch of enthusiasm and interest awakened by such talented speakers as Marcus A. Dow, general safety agent of the New York Central Lines, and Dr. Franklin C. Wells, medical director of the Equitable Life Assurance Society of the United States.

More than 800 men and a few women, all engaged in safety work, were on hand at the round-table meeting Tuesday morning, and dozens of most valuable suggestions were made in the free for all discussion on "New Ways of Keeping Up Interest in Safety."

The A B C Session, at which is told each year how to begin at the beginning in organizing a plant for safety, was this year packed to the doors. The attendance and the questions asked showed not only the eagerness of the newcomers to profit from the experiences of the older plant safety organizations, but also a similar desire on the part of those who in the past have gone at safety work in a half-hearted way and who are now ready and anxious to reorganize accident-prevention work in their plants along the most modern and efficient lines.

While the spirit of the congress as a whole was that safety had come into its own, this was particularly true in respect to public safety. The general session on public safety, Tuesday afternoon attracted as large and representative an audience, probably as ever attended a safety congress meeting. The discussion on "Law Enforcement and Its Application," by Judge George E. Mix of the Municipal Court of St. Louis—a jurist who within the last two years has attracted national attention because of his success in bringing about enforcement of traffic laws affecting safety—alone would have repaid the audience for its attendance at this meeting. Of equal value was the address on the traffic officer and his relation to the public by L. J. Smyth, manager of the Kansas City Division of the National Safety Council, who recently spent a month studying traffic safety problems in a dozen of the larger cities of the country.

Everywhere — at the sectional meetings, the general meetings, the lobby discussions, and even at small dinner-table talks—there was the feeling that to make industry safe we must go out of the shop and reach the workmen in their homes, not only with the lesson of safety but that of good health as well. The growing appreciation of this fact was manifested before the congress when the chairmen of the various industrial sections of the council included in their programs each at least one speaker on public safety or school safety.

At the Education Section meeting Fred G. Lange, director of safety of the Industrial Commission of Ohio, reported that as a result of the activities of that commission in less than one year every school and every city and county of Ohio began the teaching of safety with the opening of school this fall. This report was referred to by Mr. Price as the "Finest example of the promotion of school safety by any State department." Dr. E. George Payne, author of the plan of safety education recommended by the council, and principal of the Teachers' College of St. Louis, in a report concerning the first year's work in safety education in the public schools of St. Louis declared that since January 1 of this year fifteen school children had been killed by accidents; during the corresponding period of 1919, thirty-five school children of St. Louis had met accidental death—a clear saving of twenty lives, attributed by Dr. Payne directly to the teaching of safety in the public schools of St. Louis. His report proved beyond a doubt that safety instruction brings immediate results in fostering habits of carefulness and in the actual prevention of accidents.

The report of the secretary of the Education Section described how the council is reaching every agency—the railroads, superintendents of schools, industrial commissions, women's clubs—which can co-operate with the council in seuring the incorporation of safety in the curriculum of all the public schools of the country. In addition, he reported that thousands of the members of the council—plant managers, safety men, and individual members—are carrying on in their own communities campaigns of education toward this ultimate end.

Briefly, a few of the other distinguishing points of this congress are as follows:

Many more plants this year sent superintendents and foremen to the congress, in addition to their safety experts, than ever before.

More safety moving pictures were shown than ever before.

The Safety Library Booth of the National Safety Council was visited by hundreds of delegates who availed themselves of the library service. As many inquiries for information on a great variety of safety subjects were received at the library booth during the five days of the Congress as are are ordinarily received at the National Safety Council Library in Chicago during an entire month. More than 200 such inquiries were received at the box and sixty-five additional inquiries which will require extensive research were brought back to Chicago by the librarian.

The president of the Inddiana Chamber of Commerce came to Milwaukee to learn what other cities had done to prevent accidents and to discuss with the general manager of the council the possibility of inaugurating a public safety campaign in every city in Indiana having an association of commerce. On his return to the Chicago office immediately after the congress, the general manager was confronted with correspondence from associations of commerce in Des Moines, Iowa, and Columbus, Ohio, initiating negotiations for the establishment of local councils in those cities.

Charles P. Talman was elected president and other officers elected for the year are:

First vice-president, W. M. Cameron, secretary-treasurer of the Workmen's Compensation Service Bureau, New York City.

Second vice-president, L. A. DeBlois, manager of Safety Section, E. . du Pont de Nemours & Co., Wilmington, Del.

Third vice-president, W. E. Worth assistant manager, industrial relations department, International Harvester Company, Chicago, Ill.

Fourth vice-president, John A. Ortel, safety engineer, Carnegie Steel Company, Pittsburgh, Pa.

The following officers of the staff at the national headquarters in Chicago were re-elected:

C. W. Price, general manager; Sidney J. Williams, secretary; W. H. Frater, treasurer, and R. T. Solensten, assistant secretary.

President Tolman's statement on the contrast between the safety movement in America and Europe follows:

"There is one thing which has impressed me as particularly an essential of the safety movement, and that

is that it depends entirely upon a sense of individual responsibility.

"The safety movement in Europe was largely a matter of mechanical exhibitions and an autocratic enforcement of rules. It nevertheless did good. In England the safety movement was more paternalistic and a matter of enforcement of rules of hygiene as well as mechanical safeguarding. In America the safety movement is noticeably a democratic movement dealing, for the greater part, with the humane consideration and with the individual himself. The safety movement, where it has succeeded largely, has so succeeded because the individual was himself made to feel the responsibility both for himself and his fellow workers."

How to Save Gas and Keep Your Gas Bills Down

You are wasting gas every time you have gas burning at the side of a pan. You know, there is usually one large burner on your stove, and because that is at the front in a convenient position you are most likely to light that one whenever you have any cooking to do. But really, that large burner was designed for the frying pan or some large-base pan. To use it on a small pan is to throw gas away.

You should see to it that the burners are always kept clean and that the gas burns with a fairly blue light. If it is too yellow, then the proportions of air and gas are not right. The mixture can be regulated by the little valve at the front of the stove. If you don't know how the flame should look when the mixture is right, stop in the nearest gas office and get someone to show you.

If you allow your stewpan to become blackened with the carbon that is given off in the gas you are making them poor heat conductors. That is, it will take more gas to bring their contents to a boil. For this reason if for none other you should wash all stewpans on the bottom after each using.

Always cover every dish in which you are cooking anything, unless for some special reason it is undesirable to cover it. If you start two pans of water boiling at the same time, one covered and the other uncovered, you will see how necessary it is to do this.

It is well worth your while to buy a steamer in which you can keep several stewpans at the same time, all heated by one gas burner. They are on the order of the bain-marie so long used in hotel kitchens. Recently they have been introduced into the stores dealing in home-cooking utensils.

If you must heat water for dishwashing by gas make a practice of keeping a bowl or a large crock of water on the stove, where it may borrow waste heat from the cooking going on. When you have turned the oven off and finished baking in it slip the water in the oven. It will acquire enough heat for dishwashing just in a turned-out oven. Another way to get hot water without specially boiling it is to place a panful of water on the cover of any pan in which you happen to be cooking. Enough heat ordinarily goes off the top of the cover to heat a pan of water, and so far from robbing the pan of the heat you are actually conserving the heat inside the first pan by keeping off the air on top.

New York Gas Manufacturers Face Oil Shortage

New York gas manufacturers, facing a shortage of oil and higher prices this winter because of the public's insatiable demand for gasoline, pleaded for a guarantee of needed quantities through the American Petroleum institute but were refused. The gas stove has been a sufferer from the growth of the automobile industry and it appears it will continue to be, the manufacturers declared.

They said their industry was an essential one, while most automobiles were luxuries. They suggested allocations of oil, but were told petroleum products are sold in an open market with prices governed by the fundamental economic laws of supply and demand.

Restricted by legal regulations of both the quality and price of their product and fearing inability to get sufficient supplies of gas oil this winter at any price, the manufacturers thought the outlook a gloomy one.

R. L. Welch, secretary of the American Petroleum Institute with whom the artificial gas producers conferred, suggested they buy in low markets and building storage facilities to provide their needs for months. This, the manufacturers said, was impossible because of regulations in New York and the expense. Mr. Welch then proposed they reduce their use of gas oil as much as possible, and cut down the British thermal unit standard as low as was consistent with good business principle.

Producing Company Asks 40-Cent Rate

The gas companies in Columbus, Ohio, will have to ask 65 cents a thousand for gas as a result of the producing company demand for 40 cents a thousand instead of 18 cents which it now receives.

Using 40 cents as a basis, the new price would be 66 2/3 cents.

L. B. Denning, who represented the Ohio Fuel Supply Company at a recent hearing, declared that even if the higher rate was granted, his company would agree to furnish only 6,000,000,000 cu. ft. of gas annually to the city. This is more than 1,000,000,000 feet less than the maximum requirements last year.

Denning declared, however, that conservation induced by the higher rate, would save enough gas so 6,000,000,000 ft. would amply meet the city's requirements.

According to figures presented by Denning, Columbus used 9,815,000,000 ft. of gas last year. Of this amount, he estimated 2,500,000,000 was used by industrial consumers, leaving 7,300,000,000 ft. for domestic purposes.

An extensive campaign of education in gas conservation, together with a higher rate, in itself conducive of saving, is the only solution to the local problem, Denning declared He pointed out that the time for the extensive use of gas for heating is past.

T. J. Jones, president of the Columbus Gas & Fuel Company, and vice-president of the Federal Gas & Fuel Company, the two local distributing companies, declared they always had given Columbus all the gas made available by the producing company.

Mr. Jones declared the contract with the producers did not specify any set amount of gas to be furnished. The producing company, Mr. Jones declared, only was bound to furnish gas to domestic consumers in Columbus, after other customers of the company and cities having priority were furnished.

E. L. Taylor, attorney for the distributing companies, said the present 3-cent rate, under which the producing company furnishes gas, is on a 60-40 basis, the producing company being paid 18 cents per 1,000 ft. and the distributor 12 cents. He said it

was to be presumed any increase would be split on the same basis, giving rise to the opinion expressed by some councilmen that 65-cent gas will be the ultimate request from the distributors.

Some of the statements of Denning, in proposing the 40-cent rate, and in replying to questions from councilmen and City Attorney Scarlett, were:

"The gas situation is incurable, for Government experts say 80 per cent of Ohio's gas supply is exhausted.

"The dometics consumer is wasting approximately 50 per cent of the gas which he pays for through faulty appliances and carelessness. If a higher rate is charged more care will be exercised by the public in the use of gas.

"Our supply of gas this year will run 3,000,000,000 ft. less than last. This means Columbus faces even a greater shortage this year than last unless rates are raised and conservation is practised.

"West Virginia now is trying to enact laws which will cut out Ohio from 14,000,000,000 ft. imported from there last year. With increased rates we can pay a greater price for this gas, assuring Ohio cities a greater supply.

"The Ohio Fuel Supply Company is willing to expend $750,000 in attempting to obtain additional gas by drilling more wells. This campaign to get gas is costly and an increased rate is imperative in order that it be carried out. Put your natural gas on an artificial gas basis—raise the burners on the stoves—cut down waste and make the supply adequate by conservation."

Cambridge Company Reduces Price of Gas

The City of Cambridge, Mass., is to rejoice in a reduction in the price of its gas Nov. 1 from $1.60 to $1.50, this latter price to continue to Jan. 26. This is the first reduction in the price of gas anywhere in the State since war-time began to boost the price by repeated lifts.

At the continued hearing before the public utilities department on the petition of Mayor Quinn of Cambridge for a reduction, on the ground that the last increase from $1.10 to $1.60 was excessive and unwarranted, Albert M. Barnes, president and general manager of the company, admitted that conditions as to coal and oil had so improved that the company was ready to offer a voluntary reduction.

He offered figures to show that the $1.60 price had left the company a margin of only $992 for six months, and said it was proposed to make 70 per cent of coal gas and 30 per cent of water gas instead of a much smaller proportion of coal gas. He figured the cost at $975,458 and receipts at $1,245,932, or a margin of $270474, of which, after depreciation charges, $219,474 would be available for dividends, permitting a reduction in the price of gas to consumers of 10 cents. He declared that for four years dividends had averaged only 4.54 per cent.

Increase in Rate Tides Gas Company Over Crisis

Increases in the rate for gas in Redlands, Colton and Corona, Cal., allowed by the State Railway Commission, will not affect the proposed transfer of the Citrus Belt Gas Company's plant to San Bernardino.

With the new rates in the above towns, the company will be able to go ahead with the service, since the increase will establish its credit with the oil companies. It was shown at hearing before the commission that the company could no longer buy oil because the supply companies saw that the rate would not justify a continuance of the service. At one time recently the company's supply of oil was sufficient for only a few days' service.

The increase averages between 50 and 60 cents a thousand cubic feet. This will not be sufficient to yield a return commensurate with the service furnished, but it will tide the company over the present crisis.

Formerly the company paid $1.60 a barrel for oil. Now it is obliged to pay $2.60. Labor and material costs have increased since 1917, the old rate was fixed.

The company's statement said that a proposition would be made to the city of San Bernardino in due time and that the revision of rates would in no wise affect the proposed transfer.

Commissioner Edgerton, who heard the company's application for relief, made these observations:

"The situation confronting the people of the communities supplied by the applicant is such that they are in immediate danger of losing their gas supply within a few days. The amount of oil now on hand will not last more than a few days. The lack of funds by reason of the insufficient rates now charged has resulted in applicant's inability to properly maintain its system and provide service. The people of Redlands in particular have suffered this condition for some months and a very definite expression from them shows that they are willing to pay a reasonable price for gas if they be assured a continued and reasonably satisfactory service. The rates here established should result in giving applicant funds to completely cover its operating costs and additional credit should be thereby restored and continued operation assured for some time. The higher rates herein granted impose upon the company the obligation to improve its service and fully maintain its system."

Southern Counties Company Opposed to Mixed Gas Plans

The Southern Counties Gas Company is opposing the Los Angeles plan to serve mixed gas to Long Beach and other near-by cities that are now supplied with natural gas. The company further states that by arranging for the transmission to Long Beach for its own gas from a new field it expects to reduce the amount of gas which it has heretofore taken from the supply available to both Los Angeles and Long Beach by about 2,000,000 cu. ft. daily.

During the 1918-19 winter peak days Southern Counties drew from the supply, which also furnished natural gas to Los Angeles, as much as 5,800,000 cu. ft., and during 1919-20 peak days Southern Counties used 5,500,000 cu. ft. of this supply, but on peak days of the coming winter season Southern Counties expects to reduce this amount to about 3,500,000 cu. ft. by means of the arrangement described above, thereby releasing gas for use of Los Angeles instead of encroaching upon its supply as alleged.

It is claimed by the Southern Counties Gas Company that the city of Los Angeles had no inherent right to the use of natural gas, and that the communities served by the Southern Counties Gas Company, which, in the main, are situated near the natural-gas fields and have been for years served with natural gas, should continue to do so as long as the gas is available. The Southern Counties Gas

Company's attorney stated at the recent hearing that that company would absoutely resist any attempt to take away from it any of the natural gas which was needed for distribution throughout its own territory. It was also pointed out that in order to introduce mixed gas into the Southern Counties territory a tremendous investment in artificial-gas plants would have to be made, and thereby increase the ultimate costs of gas to the consumer, with corresponding decrease in the quality of service.

It was shown that the local company, pioneer natural-gas distributer, had shown great energy and foresight in building up its gas supply to meet the constantly growing demands of its consumers. As their consumption has increased it has independently sought and found new sources of supply. To give an idea of how the Southern Counties Gas Company has met the problem of increasing demands, it was learned that where three years ago this company obtained natural gas from but two fields, to-day it is obtaining natural gas from fifteen producers in six different and widely separated oil fields. To illustrate better how gas purchases have been increased by this utility the following figures are cited:

Gas purchased in January, 1917, 71,106,000 cu. ft.; January, 1918, 214,726,000 cu. ft.; January, 1919, 230,106,000; January, 1920, 365,373,000; September, 1920, 485,000,000 cu. ft.

The attorney for the Los Angeles Gas & Electric Company urged that the supplying of natural gas to Long Beach had resulted, and would result in the future, in the diminution of the amount of available natural gas for the city of Los Angeles, and he strongly urged that the city of Long Beach be supplied with a mixed gas. In reply to this argument the Southern Counties Gas Company pointed out that the city of Long Beach was placed on a straight, natural-gas basis at a time when a surplus of natural gas was available, and at a time when the gas companies in Los Angeles saw fit to furnish that city only with a mixed gas, although there was an abundance of natural gas then available.

That the mere fact that natural gas had now become more scarce was no reason why the city of Long Beach should be deprived of straight natural gas in order that the city of Los Angeles might reap a small benefit therefrom. It was contended by the city attorney of Los Angeles that the consumers of Los Angeles should not be penalized because the largest gas company serving them had not taken the steps to bring natural gas to Los Angeles. The Southern Counties Gas Company made reply to this contention by stating that it was certainly true that the citizens of Long Beach should not be made to suffer because of any failure upon the part of the gas company supplying gas to Los Angeles to properly take care of the interests of that city.

Southern Counties Gas Company pointed out to the railroad commission that through the foresight of the Southern Counties Gas Company in becoming a pioneer in the introduction of natural gas it had been able to supplant an inferior artificial-gas service throughout the many cities served by it with a splendid service of natural gas, and that the Southern Counties Gas Company intended to exert every effort to continue to bring to the communities served by it natural gas so long as it was available, and that it would resist by every means within its power any attempt to deprive it and its consumers of any of the natural-gas supply which the Southern Counties Gas Company has developed and brought to its various communities.

Rights of Consumers Given Recognition in New Ordinance

The new gas ordinance allowing the gas rate in Burlington, La., to be raised about 28 per cent a thousand feet or from $1.15 net to $1.48 has been adopted by the city council. The ordinance, the result of two months investigation by the council, is a decided victory for the consumers of Burlington inasmuch as it is the first real effort to regulate the operations of the gas company and give the city a modern ordinance.

The right to increase the price of gas and require a cash deposit are protection to consumers. As standard to gas companies.

Other sections of the ordinance provide for strict regulation for the protection of consumers. A standard quality of gas of 525 B.t.u. must be maintained. Gas must not in its average of gross heating value for one month fall off more than 2 per cent from standard Nor shall gas in any three consecutive days vary more than 5 per cent from standard. A penalty of $100 for each offense is provided for any failure of gas companies to conform to this standard.

The pressure of gas is regulated by a provision that is intended to secure a constant uniform service. A penalty of $100 is provided for any failure of the companies to comply with the pressure regulation.

The gas companies in Burlington are required to pay $100 a month, the cost being prorated between the two companies, to pay the salary of a gas inspector whose duty will be to test gas twice a day for heat units and two tests a day for pressure. The companies are required to pay for apparatus, estimated to cost $1,200, and install the testing apparatus in the city hall or in a building not farther from the gas-making plant than is the city hall.

The gas inspector shall test meters, when requested by consumers or the gas companies, at a charge of 50 cents. No meter shall be allowed to be used more than five years without being tested.

If a meter is found to be slow the gas companies will be permitted to make an additional charge for gas consumed for a period of ninety days only. If the meter is found to have run fast, the gas company, owning the meter, will be required to refund to the customer any excess amount over what the meter should have registered. The ordinance prescribes the conditions under which these charges or refunds shall be made.

In fixing the net price of gas the ordinance provides that if the gas bills are not paid on or before the tenth of the month following the date the bill was rendered a gross charge of $1.50 a thousand may be made.

The gas companies are permitted to ask a deposit from a consumer to guarantee pavement of bills but must pay interest of 6 per cent on each deposit.

The rates went into effect with gas bills rendered after Oct. 1, 1920.

Higher Gas Rates for Attleboro

The Department of Public Utilities has granted an increase in the price of gas to the Attleboro (Mass.) Gas Light Company from $1.40 to $1.60, effective Nov. 1. The increase to $1.40 was granted only last June, but the company pleaded a recent increase in wages granted and still further cost of operation.

United Gas & Electric Seeks Release from Guarantee

The directors of the Hartford City Gas Light Company, Hartford, Conn., will submit to the holders of the $150,000 preferred stock of the company an offer of the United Gas & Electric Corporation of New York for the payment of a dividend of $1, or 4 per cent, on the stock, the acceptance of which would release the corporation from the guarantee of the payment of 8 per cent on the stock it assumed about fifteen years ago when the stock was sold. The offer was made by the United Gas & Electric Corporation about one month ago and the matter will be referred to the stockholders for their decision.

It was explained by Judge Edward B. Bennett, president of the Hartford City Gas Light Company, that the matter had been considered by the directors of the Hartford City Gas Light Company and the decision to refer the matter to the stockholders reached. There are 3,000 shares of preferred stock in the company, each with a par value of $25, so that the offer of a dividend of 4 per cent is at the rate of $1 a share of the preferred stock. The reason for the offer is said to be because in the fifteen years the guarantee has been in effect the New York corporation has never been called on to make good the payment of the 8 per cent and it probably never will be, so considers that it would like to be released from the outstanding liability and is willing to pay a dividend to accomplish this purpose. The Hartford City Gas Light Company has always been able to pay the 8 per cent from its earnings.

The 3,000 shares of preferred stock of the Hartford company are widely distributed through Connecticut, considerable of the stock being held in Hartford, but the stockholders number between 500 and 600, so that not any great part of the $750,000 is held by any individual, and the directors by no means control the stock. The United Gas & Electric Corporation formerly managed the Hartford City Gas Light Company, the sale of stock having been made through Bodell & Co., of Providence, when the guarantee of the payment of 8 per cent on the stock was made. The New York corporation in its annual report for the year ended Dec. 31, 1919, listed properties in the following cities: Bloomington, Ill., Colorado Springs, Col., Columbia, Pa., Elmira, N. Y., Gretna, La., Harrisburg, Pa., Houston, Tex., Lancaster, Pa., Leavenworth, Kan., Lockport, N. Y., New Orleans, La., Richmond, Ind., Terre Haute, Ind., and Wilkes-Barre, Pa.

The directors of the Hartford City Gas Light Company are Edward B. Bennett, James H. Knight, Philip Roberts, Francis R. Cooley, John T. Robinson, M. G. Bulkeley, Jr., Frank C. Summer, J. J. Bodell and Lewis Sperry.

New Stack with Capacity of Two Million Feet a Day Completed

The Worcester (Mass.) Gas Light Company will start up its C stack in about a week, which means it will have a large production this fall and winter of coke. The city will in this way accumulate a reserve supply of fuel at the rate of 75 tons a day, for use in the emergency of an insufficient supply of anthracite coal.

C stack has been in process of erection and afterward of rebuilding for a number of years, and finally has been made ready for producing gas. It is a giant affair, with a capacity of 2,000,000 cu. ft. of coal gas daily, which is two-thirds of the city's consumption.

The fires were started five weeks ago, as the process of heating up the coke ovens is a delicate one, and must be slow, because of the imperative need of gradual expansion of the green silica brick which constitute the linings. One more week will see this work completed, and then the manufacture of gas and the residue by-products, coke, will begin. Once started such a stack must be kept in continuous operation, and therefore the output of coke will be constant.

The Gas Company is now well off for fuel, with 7,500 tons of gas coal in its piles and 130,000 gal. of fuel oil in its tanks, constituting a supply for two months, which with the arrival of additional fuel, apparently assures a sufficient reserve for starting the winter.

Plenty of Oil for Gas, But at Advanced Prices

A friendly, inquisitorial session of men representing the gas industry in the East and representatives of the oil industry held at the headquarters of the American Petroleum Institute, 15 West Forty-fourth Street, New York City, resulted in the former being told, with practical but well-meant bluntness, that if they would overcome their difficulties of buying oil and manufacturing their product it could be done by showing "ability and willingness to pay the market price for gas oil imposed by competitive conditions."

The meeting, which was held at the instigation of the gas interests, was designed to furnish some solution to their pressing problem involving a shortage of oil supply and its rising cost that is rapidly proving a "menace to the manufacture of artificial gas upon which 40 per cent of the population of the United States rely." R. L. Welch, secretary of the American Petroleum Institute, presided at the meeting and was the target for all sorts of queries apropos the oil situation. Philip H. Gadsden, vice-president of the United Gas Improvement Company of Philadelphia, and chairman of the Emergency Committee of the American Gas Association, was spokesman for the gas interests and, as such, had Mr. Welch on the "rack" most of the afternoon.

Mr. Welch told the gas men, after being interrogated as to the rising cost and scarcity of oil to the gas manufacturer, that although the fiercest kind of competition obtains in the oil market and that the demand for petroleum products has been much greater than the supply, that the market is as unrestricted as any in the United States and that if his "guests" would pay the current price for gas oil they'd get it. "Why," he added, "if I had the honor of being made a purchasing agent for any of your gas companies I could go out next winter and secure all the oil you wanted, provided you were willing to pay the price."

In other ways Mr. Welch urged his hearers to accommodate themselves to what he described as the "economic necessities and requirements of the times." This involved, he said, not only an ability to meet current oil prices, but a demonstration of practical creative faculties within the gas industry itself that would help in relieving an embarrass-

ing situation. In this connection Mr. Welch advised the gas interests to bend every energy towards proving the practicability of using heavier products of petroleum in the manufacture of gas than obtains now; to restrict and reduce gas oil consumption as much as possible and be more generous in the matter of storage than it has been heretofore. He recommended also, if it were possible, some modification of standards in gas manufacturing which might help in the general program of conservation.

In illustrating what he meant by an industry meeting any oil exigency on its own merits and through its own devices, Mr. Welch stated that in view of the coming price of auto gas oil and its comparative shortage automotive industries were directing their engineers to turn their attention towards designing smaller powered engines which would consume less oil yet give, by and large, the same result in speed. Present-day methods of auto production, he said, were gradually bringing this about. "Your situation," he continued, "isn't as alarming now, and won't be six months from now, as it was six months ago."

Answering a query as to how the gas industry will fare during the coming winter in the matter of oil supply, Mr. Welch said that "based upon the statistical situation I believe you'll get by all right." Replying to other questions, he stated that there was a pressing need for new wells, but that every item going into the expense of their drilling had been immeasurably increased.

Those attending the conference were: Philip H. Gadsden, A. P. Lathrop, president of the American Light & Traction Company of this city; R. A. Carter, vice-president of the Consolidated Gas Co.; Charles M. Cohn, vice-president of the Consolidated Gas, Electric Light & Power Company of Baltimore; H. G. Bradless, president, Stone & Webster, Inc., Boston; Howard Bruce, the Bartlett Hayward Company, Baltimore; R. L. Welch, Alfred Reeves, secretary of the National Automobile Chamber of Commerce, and C. E. Clarkson, secretary of the Society of Automotive Engineers.

BOSTON (MASS.) CONSOLIDATED GAS COMPANY reports output for September as 526,941 cu. ft., an increase of 2.5 per cent over Sept., 1919.

Light Plant Using Natural Gas

Furnaces in the City Light & Water Company plant, Amarillo, Tex., have been equipped with natural gas burners and other improvements to the extent of $100,000 in cost will be made on the plant before the end of the year. Construction work has started on the new battery of boilers, which were destroyed when fire partly wrecked the plant several weeks ago.

Personal Notes

DR. E. HOLMES is the newly-appointed manager of the chemistry department of the National Lime Association. He comes from Indiana where he spent a few years in high school teaching. After graduating from Indiana University in 1908, Dr. Holmes went to Cornell as a member of the staff of instruction also doing advanced work in chemistry. He received the A.M. degree from Cornell in 1910 and went to Cleveland, Ohio, as research engineer for the National Carbon Company. His researches at Cleveland resulted in notable improvements in the dry cell. His industrial experience has extended to practically all the departments of a manufacturing plant, but has been particularly in the duties of technical control of factory production, development of new products and improvement of old products, the building and operation of semi-factory plants, consulting work with departmental heads, the direction of technical research and the preparation of technical literature.

In 1919 Dr. Holmes returned to Cornell to complete his requirements for the Ph.D. degree, doing research work of purely scientific nature.

He is a member of the American Chemical Society, Electrical League and the Sigma Xi Society for original research and of the Rotary Club.

WILLIAM S. HILL, who recently resigned the superintendency of the Springfield (Mo.) Gas & Electric Company, has left for Stuttgart, Ark., where he has accepted a position as manager of the Stuttgart division of the Arkansas Light & Power Company.

HENRY L. DOHERTY & Co. and associated dealers are offering $5,000,000 Gas Securities Company two-year 8 per cent secured gold notes at 98 and interest to yield over 9 per cent. The notes are dated Oct. 1, 1920, and mature Oct. 1, 1922.

EUGENE E. STRINGER, chief clerk of the Wisconsin-Minnesota Light & Power Company, La Crosse, Wis., will succeed William T. Bracken as commercial manager. Mr. Stringer is well known in La Crosse and has had former experience in the commercial part of this business.

FRANK J. HICKLING, of Valparaiso, Ind., has been appointed as chief clerk of the Wisconsin-Minnesota Light & Gas Company, La Cross, Wis., to succeed Eugene Stringer. Mr. Hickland graduated from Notre Dame University in 1915 and he has come to La Crosse, having had wide experience in the public utilities business.

R. D. PARKER, for a number of years chief engineer of the Texas Railroad Commission, has entered upon discharge of his duties as chief engineer of the gas utilities division of the commission, to which he was recently appointed.

DR. GEORGE C. BUTTE has retired as chief supervisor of the oil and gas division, and returned to the University of Texas as a professor of law. Dr. Butte was loaned by the university regents to the Railroad Commission for one year, the time expiring this month. Successors to Parker and Butte have not been announced.

WILLIAM T. BRACKEN, commercial manager of the Wisconsin-Minnesota Light & Power Company, La Crosse, Wis., has resigned to become commercial manager for the Beloit Water Gas & Electric Company at Beloit, Wis. Mr. Bracken is leaving the local company after a successful career and takes with him the best wishes of all of his fellow employees.

PRAIRIE OIL & GAS COMPANY, Tulsa, Okla., has a well estimated at 3,000 barrels initial production daily in its first test on the Jeffers lease in Florence Field, Kansas. The well extends the pool to the southwest. The company owns leases on 560 acres in this vicinity.

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